PATENT APPLICATION

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FOR

CIRCUIT BREAKER SWITCH

The invention generally relates to the field of circuit breakers, and particularly relates to the field of re-settable circuit breaker switches that may be economically and efficiently produced.

BACKGROUND OF THE INVENTION

Circuit breaker switches generally include a reactive element (for example a bimetallic conductive material) that is in the path of the current passing through the breaker when the switch is in the on position. The reactive element responds to an excess current or voltage charge by changing a property of the reactive element such as its shape, and thereby disrupting the path of the current through the breaker.

For example, U.S. Patent No. 5,491,460 discloses a switch that includes a thermal triggering element that cooperates with other portions of the circuit in providing overcurrent protection, and U.S. Patents Nos. 5,847,638; and 5,892,426 disclose switches that specifically include a bimetallic element that changes shape to provide circuit protection against excess current. Further, U.S. Patent No.5,539,371 discloses a circuit breaking switch that includes an alloy blade 170 that changes its curvature responsive an current overload condition.

Convention circuit breaker switches, however, typically require numerous small parts that must be assembled accurately, and sometimes require minor adjustments via set screws etc. to function optimally. For example, the breaking switch disclosed in U.S. Patent No. 5,539,371 includes an adjusting screw that may be rotated to adjust the arch of a spring blade.

There is a need for a circuit breaker switch that is relatively inexpensive to produce yet operates efficiently.

There is further a need for a circuit breaker switch that provides an indication that the breaker has tripped.

There is further a need for a c circuit breaker switch that may be easily re-set.

SUMMARY OF THE INVENTION

A circuit breaker switch is disclosed, including a rocker, an actuator, and a dielectric separator element. The rocker is positionable between a first on position and a second off position. The actuator element is coupled to the rocker such that it causes a first electrically conductive contact portion to move into contact with a second electrically conductive contact portion when the rocker is in the on position. The dielectric separator element is urged between the first and second electrically conductive contact portions in the event of excess current being passed between the first and second electrically conductive contact portions.

In various embodiments, the switch further includes a trip indicator that is coupled to the dielectric separator element such that the trip indicator provides a visual indication that excess current has been passed between the first and second electrically conductive contact portions. In further embodiments, the switch may be reset by depressing the trip indicator.

BRIEF DESCRIPTION OF THE DRAWINGS

The following detailed description of the illustrated embodiments may be further understood with reference to the accompanying drawings in which:

Figure 1 shows an illustrative isometric view of a circuit breaker switch of the invention;

Figure 2A shows an illustrative side sectional view of the circuit breaker switch shown in Figure 1 in the off position taken along line A - A thereof;

Figure 2B shows an illustrative end sectional view of the circuit breaker switch shown in Figure 1 in the off position taken along line B - B thereof;

Figure 2C shows an illustrative bottom sectional view of the circuit breaker switch shown in Figure 1 in the off position taken along line C - C thereof;

Figure 3A shows an illustrative side sectional view of the circuit breaker switch shown in Figure 1 in the on position taken along line A - A thereof;

Figure 3B shows an illustrative end sectional view of the circuit breaker switch shown in Figure 1 in the on position taken along line B - B thereof;

Figure 3C shows an illustrative bottom sectional view of the circuit breaker switch shown in Figure 1 in the on position taken along line C - C thereof;

Figure 4A shows an illustrative side sectional view of the circuit breaker switch shown in Figure 1 in the trip position taken along line A - A thereof;

Figure 4B shows an illustrative end sectional view of the circuit breaker switch shown in Figure 1 in the trip position taken along line B - B thereof; and

Figure 4C shows an illustrative bottom sectional view of the circuit breaker switch shown in Figure 1 in the trip position taken along line C - C thereof.

The drawings are for illustrative purposes only and are not to scale.

DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS

As shown in Figure 1, a circuit breaker switch 10 in accordance with an embodiment of the invention includes a housing 12 that includes a pair of resilient retainer portions 14 for mounting the circuit breaker switch 10 and a top portion 16. The circuit breaker switch10 also includes an ON/OFF rocker 18 and a trip indicator 20 that are exposed through openings in the top portion 16 of the housing 12.

Generally, during use an electrically conductive path may be established between a line terminal 22 and a load terminal 24 by positioning the ON/OFF rocker 18 to the ON position. If the circuit breaker switch 10 is overloaded and trips, then the trip indicator 20 will protrude through the top portion 16 of the housing 12. The switch 10 may then be reset by depressing the trip indicator 20 as discussed below in further detail. Figures 2A - 2C show the switch 10 in the OFF position, Figures 3A - 3C show the switch 10 in the ON position, and Figures 4A - 4C show the switch 10 in the trip position.

As shown in Figure 2A, the rocker 18 is pivotally coupled to an actuator block 26 such that as the rocker 18 is moved from the OFF position (as shown in Figure 2A) to the ON position (as shown in Figure 3A), the lower portion of the block 26 is wedged between the adjacent inner wall 30 of the housing 12 and a spring plate 28. As shown in Figure 2B, the spring plate 28 includes a first electrically conductive contact element 32, and as the block 26 is wedged between the inner wall 30 of the housing 12 and the spring plate 28, the contact element 32 is urged to move against a second electrically conductive contact element 34 as shown in Figure 3B. The second contact element 34 is mounted on a bimetallic strip 36 that is electrically coupled to the line terminal 22 as shown in Figure 2C. The spring plate 28 is electrically coupled to the load terminal 24 as shown in Figure 2C, and when the first and second contact elements 32 and 34 are in contact with one

another as shown in Figures 3A - 3C, electrical conductivity is established between the line terminal 22 and the load terminal 24.

The switch 10 also includes a rotating dielectric lever 38 that is pivotally coupled to an indicator lever 40, the top of which includes the indicator 20. The switch 10 also includes bias spring 42 that urges the lower portion of the lever 38 against the second contact element 34 as shown in Figures 2B and 3B. If the breaker switch 10 is overcharged, the bimetallic strip 36 bends responsive to the excess current causing the second contact element 34 to be drawn away from the first contact element 32 as shown in Figure 4C. The lower portion of the lever 38 is then urged between the contacts 32 and 34 as shown in Figures 4B and 4C ensuring that the elements 32 and 34 are not in electrical contact with one another.

As shown in Figure 4A, the rotation of the dielectric lever 38 causes the indicator lever 40 to move upward through the top portion 167 of the housing 12. The indicator 20 is included in the top of the lever 40 and provides a visual indication that the breaker has tripped. The switch 10 may then be turned off by moving the rocker to the OFF position as shown in Figure 2A, and the switch may be reset by depressing the indicator 20 back into the top portion 16 of the housing 12. This will cause the dielectric lever to return to the position shown in Figures 2B, 2C, 3B and 3C.

Circuit breaker switches such as that disclosed above may be efficiently and economically produced due to the relatively few number of parts required. Those skilled in the art will appreciate that modifications and variations may be made to the above disclosed embodiments without departing from the spirit and scope of the invention.

What is claimed is: